UNITED STATES PATENT OFFICE.

SAMUEL RAUB, JR., OF WILKES-BARRE, PENNSYLVANIA.

OPENING AND CLOSING SAFETY-VALVES OF STEAM-BOILERS.

Specification of Letters Patent No. 75, dated November 8, 1836.

To all whom it may concern:

Be it known that I, SAMUEL RAUB, Jr., of Wilkes-Barre, in the county of Luzerne and State of Pennsylvania, have invented an Improvement in the Mode of Opening and Closing the Safety-Valves of Steam-Boilers, which improvement renders the valve self-acting whenever the water in the boiler descends below the proper water-line; and I do hereby declare that the following is a full and exact description thereof.

I in general construct my safety valve in the ordinary way, using the common conical valve, and seat, and a lever of second kind with its movable weight, and my improvement in extending the lever beyond the fulcrum on the side opposite to that upon which the weight is hung so that it becomes like a scale beam with unequal arms, and receives a counterweight suspended to it by a suitable rod passing through a stuffing box in the top of the boiler, the counter weight being ordinarily submerged in the water contained in the boiler.

It is a well known principle in mechanical philisophy that a body submersed in water loses as much of its effective weight as is equal to the actual weight which it displaces, if therefore there be suspended to the short arm of the lever above described a weight which in air is an exact counterpoise to the weight, by which the valve is loaded on the long arm, the whole pressure would be taken off the valve, but on submersing such counterpoise in water, the valve would be forced down with a power dependent upon the weight of water thereby displaced. Such is the action of my weight within the boiler. When the boiler is sufficiently full of water the weight may be wholly submersed, and the upward pressure of the water will be added to that of the weight by which the valve is loaded be the same more, or less, but when the water sinks below the weight within the boiler its tendency is then to coöperate with the elasticity of the steam and to open the valve, which tendency increases as the water becomes exhausted, and would continue to increase until the weight was entirely uncovered by water, did not the opening of the valve previously take place.

It is manifest that by this contrivance the two weights may be so adjusted to each other as that the valve may be made to open under any required degree of pressure, and that this opening may take place by the elasticity of the steam alone, without the water being too much exhausted as in the ordinary construction, but that when such exhaustion takes place the gravity of the interior weight operates concurrently with the elasticity of the steam. It is also manifest that the operation of the interior weight as described is not the same with those floats which have been applied in different ways either to let off a portion of steam, or act as a tell-tale when the water subsides, or to set in operation a feeding apparatus, but that the only, and direct effect which I wish to produce is the actual opening of the safety valve, and the blowing off of the steam.

The kind of weight which I use will depend upon the construction of the boiler in which it is employed, as for example in boilers the flues of which are but a few inches under water, the weight must be in such a shape as will be adapted thereto. It will be best made of metal, and it may be either solid, or hollow so that its weight, and bulk may bear any desired proportion to each other.

I have thus described what I deem the best arrangement for carrying the principle upon which I proceed into effect, but other arrangements may be resorted to, by which the same end may be attained. There may, for example, be added on the side of the fulcrum opposite to the ordinary valve, a second valve opening inward, and exposing an equal area to the action of the steam, in this case, the pressure of the steam being equal upon both valves they will remain stationary under the elastic pressure of the steam alone, but when the inside weight is not sustained by the pressure of the water, both valves will be opened, and the steam will escape through the double outlet. With the addition of this reversed valve the outside weight may be much diminished, or it may be entirely omitted, the closing of the valve being effected by the pressure of the steam on the reversed valve.

I claim as my invention—

The application of a weight within the boiler of a steam engine which as the boiler becomes exhausted shall operate upon the principle, and in the manner herein set forth, so as to open the safety valve, or valves, and thus cause the free escape of steam, thereby preventing all danger of explosion from the undue exhaustion of the water.

SAMUEL RAUB, Jr.

Witnesses:
THOS. P. JONES,
JACOB BUTH.